Honeywell

User Manual for the
One Wireless™ Series
WCX Series XYR 6000 Valve Position Sensor

ISSUE 3
50040849

⚠ WARNING
MISUSE OF DOCUMENTATION
- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING
PERSONAL INJURY
- DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING
RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE.
If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

Failure to comply with these instructions could result in death or serious injury.

This document describes preparation, operation and maintenance of the Honeywell OneWireless™ WCX Series valve position sensor and antennas. Mounting and installation are covered in other documents.

Honeywell does not recommend using devices for critical control where there is a single point of failure or where single points of failure could result in unsafe conditions. Honeywell OneWireless™ solutions are designed for open loop control, supervisory control, and controls that do not have environmental or safety consequences. As with any process control solution, the customer must weigh the risks and benefits to determine if the products used are suitable for the application based on security, safety, and performance. Additionally, it is up to the customer to ensure that the control strategy defaults to a safe operating condition if any crucial segment of the control solution fails.

The latest copy of this manual and other documentation associated to the WCX Series XYR 6000 Wireless Valve Position Sensor is available at:

http://hpsweb.honeywell.com/Cultures/en-US/Products/Wireless/xyr6000wireless/XYR6000ValvePositioner/default.htm

References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title
WCX Series XYR 6000 Wireless Valve Position Sensor Quick Start Guide
Getting Started with Honeywell OneWireless™ Solutions
OneWireless™ Wireless Builder User's Guide
OneWireless™ Builder Parameter Reference

Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user, often in terms of performing a task.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING, Risk of electrical shock: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible.
	ESD HAZARD: Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	Protective Earth (PE) terminal: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	The Canadian Standards mark means the equipment has been tested and meets applicable standards for safety and/or performance.
	The Ex mark means the equipment complies with the requirements of the European standards that are harmonised with the 94/9/EC Directive (ATEX Directive, named after the French "ATmosphere EXplosible").
N314	**C-Tick Mark.** The C-Tick Mark is a certification trade mark registered to ACMA (Australian Communications and Media Authority) in Australia under the Trade Marks Act 1995 and to RSM in New Zealand under section 47 of the NZ Trade Marks Act. The mark is only to be used in accordance with conditions laid down by ACMA and RSM. This mark is equal to the CE Mark used in the European Union.
0981	**Notified Body**. For radio equipment used in the European Union in accordance with the R&TTE Directive, the CE Mark and the notified body (NB) identification number is used when the NB is involved in the conformity assessment procedure. The alert sign must be used when a restriction on use (output power limit by a country at certain frequencies) applies to the equipment and must follow the CE marking.

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1. Introduction

1.1 Purpose

This manual describes the Honeywell OneWireless™ WCX Series Valve Position Sensor function, operation and maintenance.

1.2 Scope

This manual includes details of topics that relate uniquely to the Honeywell WCX Series valve position sensor.

This manual does not cover installation, mounting, or wiring. See WCX Series XYR 6000 Wireless Valve Position Sensor Quick Start Guide (document 50040850).

1.3 OneWireless™ Network Overview

Honeywell OneWireless™ Solutions are an all-digital, serial, two-way communication mesh network that interconnects industrial field sensors to a central system.

OneWireless™ has defined standards to which field devices and operator stations communicate with one another. The communications protocol is built as an "open system" to allow all field devices and equipment that are built to OneWireless™ standard to be integrated into a system, regardless of the device manufacturer. This interoperability of devices using OneWireless™ technology is to become an industry standard for automation systems.

1.4 About the Sensor

The WCX Series Valve Position Sensor is furnished with OneWireless™ interface to operate in a compatible OneWireless™ system. The sensor is designed to operate with any OneWireless-registered device.

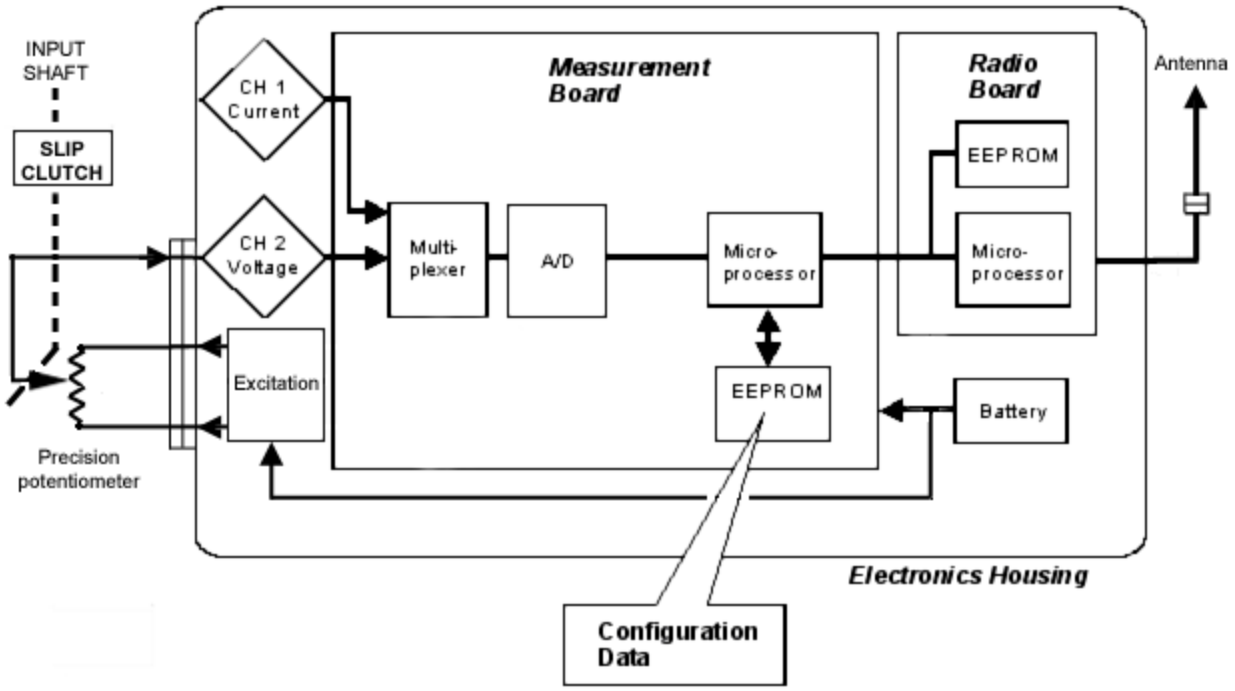
The sensor includes OneWireless™ electronics for operating in a 2.4GHz network. It features function block architecture.

Input

The WCX Series valve position sensor supports no electrical signal inputs.

The sensor measures a mechanical angular position and transmits a digital output signal proportional to the measured value. Figure 1 shows the functional diagram.

Figure 1. WCX Series valve position sensor functional diagram


INPUT SHAFT
SLIP CLUTCH
CH 1 Current
CH 2 Voltage
Excitation
Precision potentiometer
Measurement Board
Multi-plexer
A/D
Micro-processor
EEPROM
Radio Board
EEPROM
Micro-processor
Battery
Antenna
Electronics Housing
Configuration Data

2. Specifications

2.1 European Union Usage

This product may be used in any of the following European Union nations.

Country	ISO 3166 2 letter code	Country	ISO 3166 2 letter code
Austria	AT	Latvia	LV
Belgium	BE	Liechtenstein	LI
Bulgaria	BG	Lithuania	LT
Cyprus	CY	Malta	MT
Czech Republic	CZ	Netherlands	NL
Denmark	DK	Norway	NO
Estonia	EE	Poland	PL
Finland	FI	Portugal	PT
France	FR	Romania	RO
Germany	DE	Slovakia	SK
Greece	GR	Slovenia	SI
Hungary	HU	Spain	ES
Iceland	IS	Sweden	SE
Ireland	IE	Switzerland	CH
Italy	IT	United Kingdom	BG

2.2 Certifications and Approvals

See the product label for applicable approvals and ratings.

Approval / Item	Ratings / Description
cCSAus Explosion Proof with IS outputs	CLASS I, DIV 1 GROUPS B, C, D, T6 CLASS II, DIV 1 GROUPS E, F, G CLASS III CLASS 1 ZONE 1 A/Ex d [ia] IIC T6 CLASS II ZONE 21 AEx tD [iaD] 21 T85C DIP A21 IP66 T85C Tamb -40 °C to 70 °C
ATEX / IEC Ex Flameproof with IS outputs	Ex d [ia] IIC T6 Gb EX tb IIIC T85°C IP66/67 Db Tamb -40 °C to 70 °C
NEMA Enclosure Type	NEMA 1, 3, 4, 4X, 6, 6P, 13 and IP66/67
Class II and III installations and for Type 4X/IP66 applications require that all cable and unused entries be sealed with a Zone 1 certified seal fitting. Seal fittings are supplied by Honeywell.	

For detailed sensor specifications see the following Specification and Model Selection Guide:

- WCX Series valve position sensor installation drawing

2.3 Agency Compliance Information

This section contains the Federal Communications Commission (FCC), Industry Canada (IC) and Radio Frequency compliance statements for the OneWireless™ Multinode device.

ATTENTION

WCX Series valve position sensor units must be professionally installed in accordance with the requirements specified in the *OneWireless™ XYR6000 Agency Compliance Professional Installation Guide.*

FCC compliance statements

- This device complies with Part 15 of FCC Rules and Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radiofrequency energy and, if not installed and used in accordance with these instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- Intentional or unintentional changes or modifications must not be made to the Multinode unless under the express consent of the party responsible for compliance. Any such modifications could void the user's authority to operate the equipment and will void the manufacturer's warranty.

IC compliance statements

- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (EIRP) is not more than that permitted for successful communication.
- Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
- This Class A digital apparatus complies with Canadian ICES-003.
- French: Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Radio Frequency (RF) statement

To comply with FCC's and Industry Canada's RF exposure requirements, the following antenna installation and device operating configurations must be satisfied.

- Remote point-to-multi-point antenna(s) for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between the antenna(s) of greater than 20 cm [7.87 in] and a separation distance of at least 20 cm [7.87 in] from all persons.
- Remote fixed point–to-point antenna(s) for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between the antenna(s) of greater than 20 cm [7.87 in] and a separation distance of at least 100 cm [39.37 in] from all persons.
- Furthermore, when using integral antenna(s) the Multinode unit must not be co-located with any other antenna or transmitter device and have a separation distance of at least 20 cm [7.87 in] from all persons.

European Union restriction

France restricts outdoor use to 10mW (10dBm) EIRP in the frequency range of 2,454-2,483.5 MHz. Installations in France must limit EIRP to 10dBm, for operating modes utilizing frequencies in the range of 2,454 – 2,483.5MHz.

2.4 Honeywell European (CE) Declaration of Conformity (DoC)

This section contains the European Declaration of Conformity (DoC) statement, for the Honeywell OneWireless™ WCX Series valve position sensor.

Honeywell

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Registered No 217808 (England)

EC Declaration of Conformity

Honeywell Control Systems Ltd. hereby declare that the products identified below conform to the essential requirements of the EC Directive(s) listed below and that the products supplied are in conformity with the type described in any EC Type Examination Certificate (EC TEC) identified below.

Manufacturer: Honeywell International, MICRO SWITCH Division,
11309 West Chetlain Lane, Galena, Illinois, IL 61036-0327, USA

Product: Limit Switch – CX Wireless (see Sira Report No: R51A19842A)

See page 2 for WCX1 listing chart

Directive (Amendments)	**Conformity Details**	
2004/108/EC (consolidated 89/336/EEC)	Standards applied:	EN 61326-1:2006
1999/5/EC	Standards applied:	EN 300 328 V1.7.1 EN 301 489-17 V2.1.1 EN 301 489-1 V1.8.1
94/9/EC	Standards applied:	EN 60079-0:2006 EN 60079-1:2007 EN 60079-11 :2007
2006/95/EC	Standards applied:	EN 61010-1:2001
	EC TEC No:	Sira 09ATEX1093X
	Notified Body:	Sira Certification, Rake Lane, Ecclestone, Chester, CH4 9JN, UK

Signed on behalf of Honeywell Control Systems Ltd.: .....

Frank Turnbull, S&C, Chief Engineer

DoC No: A420	DoC Issue: 1	DoC Date: 15/05/2009	Page 1 of 2

European Declaration of Conformity statements

Language	Statement
Česky (Czech):	***Honeywell*** tímto prohlašuje, že tento ***Multinode*** je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
Dansk (Danish):	Undertegnede ***Honeywell*** erklærer herved, at følgende udstyr ***Multinode*** overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
Deutsch (German):	Hiermit erklärt ***Honeywell***, dass sich das Gerät ***Multinode*** in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
Eesti (Estonian):	Käesolevaga kinnitab ***Honeywell*** seadme ***Multinode*** vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, ***Honeywell***, declares that this ***Multinode*** is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Español (Spanish):	Por medio de la presente ***Honeywell*** declara que el ***Multinode*** cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Ελληνική (Greek):	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ ***Honeywell*** ΔΗΛΩΝΕΙ ΟΤΙ ***Multinode*** ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Français (French):	Par la présente ***Honeywell*** déclare que l'appareil ***Multinode*** est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
Italiano (Italian):	Con la presente ***Honeywell*** dichiara che questo ***Multinode*** è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski (Latvian):	Ar šo ***Honeywell*** deklarē, ka ***Multinode*** atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių (Lithuanian):	Šiuo ***Honeywell*** deklaruoja, kad šis ***Multinode*** atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Nederlands (Dutch):	Hierbij verklaart ***Honeywell*** dat het toestel ***Multinode*** in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
Malti (Maltese):	Hawnhekk, ***Honeywell***, jiddikjara li dan ***Multinode*** jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
Magyar (Hungarian):	Alulírott, ***Honeywell*** nyilatkozom, hogy a ***Multinode*** megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
Polski (Polish):	Niniejszym ***Honeywell*** oświadcza, że ***Multinode*** jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
Português (Portuguese):	***Honeywell*** declara que este ***Multinode*** está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Slovensko (Slovenian):	***Honeywell*** izjavlja, da je ta ***Multinode*** v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky (Slovak):	***Honeywell*** týmto vyhlasuje, že ***Multinode*** spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Suomi (Finnish):	***Honeywell*** vakuuttaa täten että ***Multinode*** tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska	Härmed intygar ***Honeywell*** att denna ***Multinode*** står I överensstämmelse med de väsentliga

Language	Statement
(Swedish):	egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.
Íslenska (Icelandic):	Hér með lýsir ***Honeywell*** yfir því að ***Multinode*** er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 1999/5/EC.
Norsk (Norwegian):	***Honeywell*** erklærer herved at utstyret ***Multinode*** er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.

For more information about the R&TTE Directive

The following website contains additional information about the Radio and Telecommunications Terminal Equipment (R&TTE) directive:

http://ec.europa.eu/enterprise/rtte/faq.htm

3. Preparation

3.1 Battery Connecting Procedure

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

Connection and disconnection of the batteries should only be performed in a non-hazardous area.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

Failure to comply with these instructions could result in death or serious injury.

ATTENTION

Both batteries must be the same model from the same manufacturer. Mixing old and new batteries or different manufacturers is not permitted.

Use only the following 3.6V lithium thionyl chloride (Li-SOCl2) batteries (non-rechargeable), size C. No other batteries are approved for use in WCX Series Valve Position Sensors.

- Xeno Energy XL-145F
- Tadiran TL-5920/S

Table 1. Battery Connecting Procedure (For item numbers, refer to Figures 2 and 3)

Step	Action
1	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
2	If necessary, place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
3	Using two fingers, press down slightly on both battery tops (4) and remove battery insulator (5). Insure that the batteries are properly seated and making good contact.
4	Replace cover, tightening hand tight. If applicable, replace cover lock clamp (2) and two T-15 TORX screws (1).

Figure 2. Battery connecting

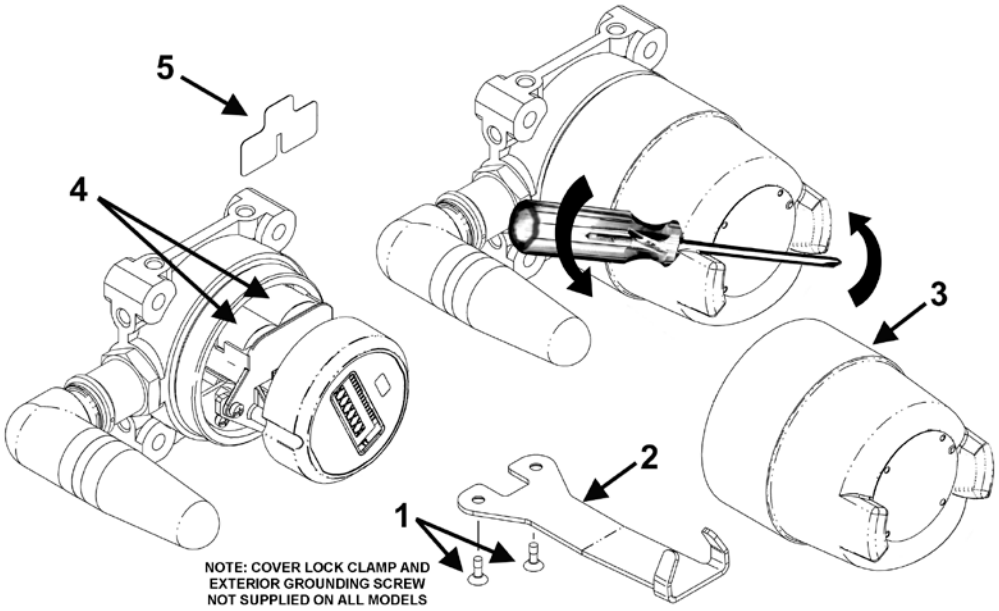
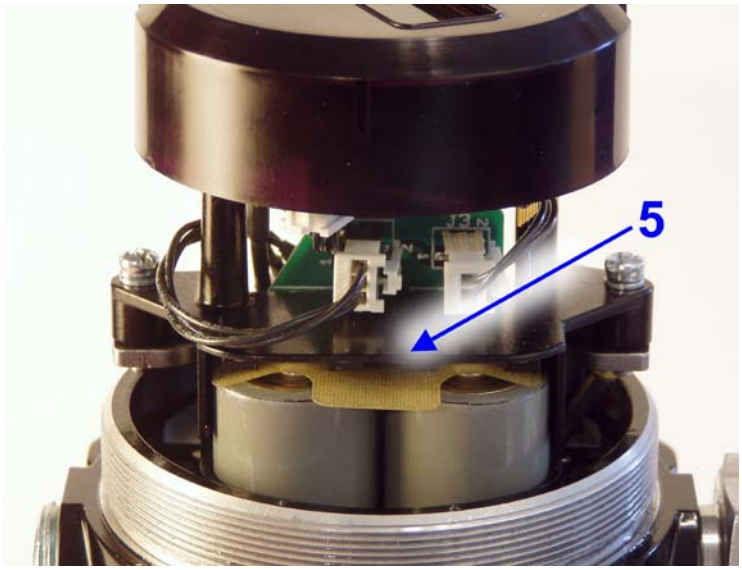


Figure 3. Battery connecting detail



3.2 Installation

Refer to the WCX Series Valve Position Sensor Quick Start Guide (document 50040850) for installation and mounting of your WCX Series valve position sensor.

3.3 Antenna Adjustment and Mounting

Requirements

- **Radio Installation Requirements**

ATTENTION

Professional Installation is required to insure conformity with Federal Communications Commission (FCC) in the USA, Industry Canada (IC) in Canada and the Radio and Telecommunications Terminal Equipment Directive, 1999/5/EC (R&TTE), in the European Union (EU).

Professional installation is required for the selection and installation of approved antennas and setup of the maximum allowable radiated power from the WCX Series valve position sensor as configured for the particular installation site.

The antennae used for this sensor must be installed to provide a separation distance of at least 20 cm (8 inches) from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

For remote antenna, see antenna installation requirements to satisfy FCC RF exposure requirements.

ATTENTION

Federal Communications Commission (FCC):

The WCX Series Valve Position Sensors comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada (IC):

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF fields in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's web site www.hc-sc.gc.ca/rpb.

Integral Antenna

⚠ WARNING
POTENTIAL ELECTROSTATIC CHARGING HAZARD
The integrally mounted antenna shroud is made of Teflon® and has a surface resistance greater than 1Gohm per square. When the WCX Series Valve Position Sensor is installed in potentially hazardous locations care should be taken not to electrostatically charge the surface of the antenna shroud by rubbing the surface with a cloth, or cleaning the surface with a solvent. If electrostatically charged, discharge of the antenna shroud to a person or a tool could possibly ignite a surrounding hazardous atmosphere.
Failure to comply with these instructions could result in death or serious injury.

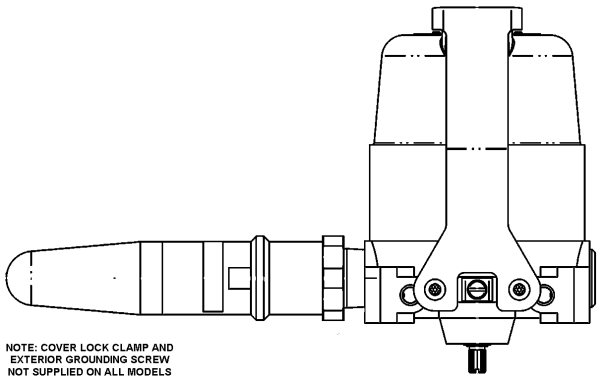
- **Elbow**

Figure 4. Elbow antenna adjustment

If your model has the integral elbow antenna you can adjust it to improve reception. The least signal radiation is in a direction in line with the top (pointed end), so it is best to avoid having the antenna pointed directly toward, or directly away from, the multinode. Typically, pointed straight up gives best performance but your installation may vary. Loosen the 1,5 mm [approx. 1/16 in] set screw located near the antenna base. Rotate antenna for best reception. Do not rotate antenna more than 180 degrees either direction or the internal antenna cable could be damaged. Tighten set screw.

- **Straight**

Figure 5. Integral straight antenna



If your model has the integral straight antenna you can adjust its position by rotating the sensor housing. (See Section 2). Typically, pointed straight up gives best performance but your installation may vary.

3.4 Configuration

The WCX valve position sensor contains a mechanical interface compatible for connecting to the OneWireless™ network. An operator uses the wireless builder application to configure blocks, to change operating parameters, and to create linkages between blocks that make up the sensor's configuration. These changes are written to the sensor when it is authenticated by a security key. See Section 5.

If this is the first WCX Series sensor installed on your OneWireless™ network you will need to update the DD files in wireless builder in order to properly communicate with the WCX Series sensor. These files are available on the CD that was included with the sensor. If this is not the first device, please proceed to section 3.5.

Table 2. Updating DD Files

Step	Action
1	Copy the folder "WCX DD files" from the provided WCX Series documentation CD to a known location on the host PC. The files may also be downloaded from the web at: **http://hpsweb.honeywell.com/Cultures/en-US/Products/Wireless/xyr6000wireless/XYR6000ValvePositioner/default.htm**
2	Go to File->New->Type->Wireless Device and then browse to the path of the WCX DD Files.
3	Select the device that appears and then click OK. This creates a new device type in Wireless Builder.

3.5 Connecting to Network

For instructions on how to use an Authentication Device to connect the WCX Series sensor to the OneWireless™ network, see Section 5.6.

Table 3. Connecting and Commissioning the Sensor

Step	Action
1	Connecting device to OneWireless™ network
1.1	If applicable, remove two T-15 TORX screws and cover lock clamp.
1.2	Using a screwdriver or other tool across the two tabs of the cover, unscrew and remove the cover.
1.3	Remove the battery insulator. Reseat the batteries if necessary and verify that the LCD display reads "NO KEY"
1.4	After transmitter restarts, use authentication device to transmit key and connect transmitter.
1.5	Device will go through discovery mode, then secure itself to OneWireless™ network. After this phase, the WCX sensor will appear in Wireless Builder as an uncommissioned device.
2	Commissioning device in Wireless Builder
2.1	Right click on the WCX device block and select commission device. If a prompt appears requesting DD files, then exit this screen and follow the instructions in Table 2.
2.2	Enter a new tag name if desired. Click Next and then click Finish.
2.3	Right click on the device tranducer block and then select Activate -> Selected Device.
2.4	Wait a few minutes and then the device will be active and transmitting data.

3.6 Setting the Range and Engineering Units

Position Sensor with NO shaft restoring force (Shaft Code A, B, N):

The WCX valve position sensor **with NO shaft restoring force** is calibrated at the factory to a range of 0 % to 100 % over a 250° span. However it is possible to set the range or rescale the sensor's engineering units to give an output within the particular range of the application (i.e. -125° to +125°) (see range setting below).

Position Sensor with shaft spring return force (Shaft Code C, D, M):

The WCX valve position sensor **with shaft spring return force** is calibrated at the factory to a range of 0 % to 100 % over a ±90° span. However it is possible to set the range or rescale the sensor's engineering units to give an output within the particular range of the application (i.e. -45° to +45°) (see range setting below).

There are options in Wireless Builder to restore calibration and clear calibration. Do not use the Cal Clear or Cal Restore options as this may result in incorrect sensor output readings and require the unit to be returned for factory calibration.

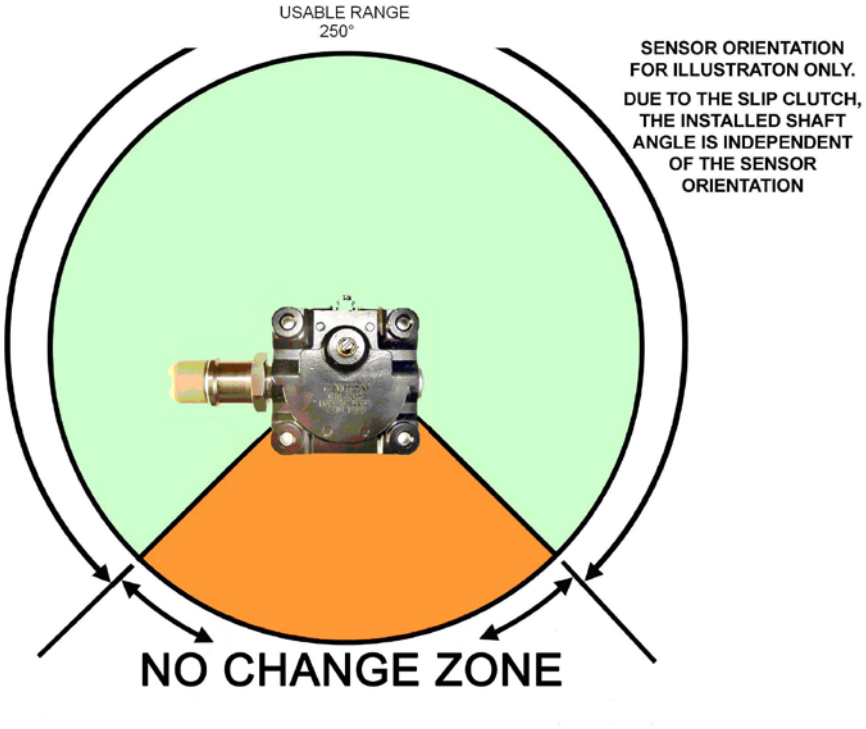
Range Setting:

Calibration units (CAL_UNIT) can be set from wireless builder. This determines what measurement units the output of the sensor will be display. The choices for the WCX Series are:

Percent	Percent of max rotation (Default)	max range 0 % to 100 %
Deg.	Degrees of rotation	Max range 250° (may be 0° to 250° or -125° to +125°, or -45° to +45° for example)
Volts dc	Internal potentiometer voltage	Max range 0.0 V to 1.7 V nominal This is only used for factory calibration

The WCX valve position sensor input shaft is connected to a potentiometer through a slip clutch, limiting the usable output range to 250 degrees. When rotated past 250° the output of the sensor will remain constant. This is depicted as a "no change zone" on the below drawing.

Figure 6. Usable Range



Positioning the sensor shaft

Prior to coupling the sensor shaft to the valve shaft, the user should ensure the sensor shaft is not in the "no change zone" anywhere within the usable range of the valve. Do this by following these procedures:

If the desired rotation of the sensor shaft when installed in the application is counterclockwise (CCW) then rotate the shaft a full rotation clockwise (CW) and then at least 45° CCW.

If the desired rotation of the sensor shaft when installed in the application is CW then rotate the shaft a full rotation counterclockwise (CCW) and then at least 45° CW.

The amount of rotation in the desired direction (45° rotation) will affect the useable range of the sensor. To achieve the full 250° rotation, do not rotate the shaft back more than 55°.

Scaling or Converting the Engineering Units

Table 3 outlines the procedure for scaling engineering units to a percentage that matches to the application.

Table 4 outlines the procedure for converting engineering units from percentage to angular degrees.

Table 4. Scaling Engineering Units to Match the Application

Step	Action
	In order to speed up the process of scaling the engineering units, it is recommended to change the update rate of the sensor prior to adjusting the engineering units. Follow step 1 to change the update rate.
1	**Changing the update rate (after device has been commissioned)**
1.1	In the Offline window, double-click on the WCX transducer block (small rectangle with a T inside). The parameters page will open.
1.2	In the Configuration tab, note the current update rate setting. If it is set to the default value of 30 seconds, change the "Period" to 1 second and click OK.
1.3	In the Offline window, right-click on the WCX Main block and click Load.
1.4	Ensure that "State to Load" is set to OOS and "Post Load State" is set to Normal, and that both boxes at the bottom of the window are checked. This will change the update rate on the sensor and re-load it.
	WARNING The following steps require reading the sensor output. If the sensor is currently installed in a hazardous atmosphere, reading this output should be done via Wireless Builder or a mobile station. Do not remove the cover from the sensor in a hazardous atmosphere.
2	**Scaling the engineering units.**
2.1	Prior to performing this procedure, the sensor should be mounted in the application and the sensor shaft should be coupled to the valve.
2.2	In Wireless Builder, verify the range units are set to their factory defaults of EU@100% = 314 and EU@ 0% = -4. If they are not, follow the steps in table 4 to reset the factory defaults.
2.3	Position the valve to the desired 0% location. Wait until the output stabilizes and record the sensor output at this location. This value is noted as "PV_0" in the equation below.
2.4	Position the valve to the desired 100% location. Wait until the output stabilizes and record the sensor output at this location. This value is noted as "PV_{100}" in the equation below.

Step	Action
	The following step contains an equation used to convert the engineering units. As as alternative to using this equation you may use the file, "WCX1 Engineering Units Calculator" which can be found on the WCX Series documentation CD that was included with the sensor.
2.5	Calculate the Engineering Units at 0% and 100% using the following equations:

$$EU@0\% = -PV_0 * (\frac{100}{PV_{100} - PV_0}) - (\frac{100}{PV_{100} - PV_0}) * 4$$

$$EU@100\% = (\frac{100}{PV_{100} - PV_0}) * 317 + (\frac{100}{PV_{100} - PV_0}) * 4 + EU@0\%$$

Please note – the 317 value is a constant that is inherent to the setup of the device. The 100 value is a ratiometric constant. These constants have no relevance to the user other than their use in the above formula.

Example

With the valve at the desired 0% position the sensor output is reading 25.0 PCT and at the desired 100% position, the sensor output is reading 75.0 PCT. The value for EU@0% and EU@100% would then be:

$$EU@0\% = -25 * (\frac{100}{75 - 25}) - (\frac{100}{75 - 25}) * 4 = -58$$

$$EU@100\% = (\frac{100}{75 - 25}) * 317 + (\frac{100}{75 - 25}) * 4 + -58 = 584$$

2.6 In Wireless Builder, in the Main tab, set Actual Mode to OOS. In the Range tab, input these two values in the appropriate fields. After inputting the new EU Values, in the Main tab, set Actual Mode to AUTO.

2.7 Adjust the valve to the 0% position and confirm that the sensor output now displays 0 PCT. Do the same at the 100% position.

3 **Reset update rate.**

3.1 In the Offline window, double-click on the WCX transducer block (small rectangle with a T inside), the parameters page will open.

3.2 In the Configuration tab, change "Period" to 30 seconds. Click OK. Note: If a different update rate is required by the application, it should be selected at this time, however maximum battery life will be obtaining with the 30 second update rate setting.

3.3 In the Offline window, right-click on WCX Main block and click Load.

3.4 Ensure that "State to Load" is set to OOS and "Post Load State" is set to Normal, and both boxes at the bottom of the window are checked. This will change the update rate on the sensor and re-load it.

3.5 In the Main tab, change "Actual Mode" to AUTO.

3.6 Unit is scaled correctly and is active.

Table 5. Converting Engineering Units from Percent to Degrees

Step	Action
	In order to speed up the process of scaling the engineering units, it is recommended to change the update rate of the sensor prior to adjusting the engineering units. Follow steps 1-1.4 in table 3 to change the update rate.
	WARNING The following steps require reading the sensor output. If the sensor is currently installed in a hazardous atmosphere reading this output should be done via Wireless Builder or a mobile station. Do not remove the cover from the sensor in a hazardous atmosphere.
1	Prior to performing this procedure, the sensor should be mounted in the application and the sensor shaft should be coupled to the valve.
2	In Wireless Builder, verify the range units are set to their factory defaults of EU@100 % = 314 and EU@ 0 % = -4. If they are not, follow the steps in table 4 to reset the factory defaults.
3	On the range tab, change the CAL_UNIT to deg.
4	Position the valve to the desired 0° location. Wait until the output stabilizes and record the sensor output at this location. This value is noted as “PV0” in the equation below.
	The following step contains an equation used to convert the engineering units. As as alternative to using this equation you may use the file, “WCX1 Engineering Units Calculator” which can be found on the WCX Series documentation CD that was included with the sensor.
5	Calculate the Engineering Units at 0% and 100% using the following equations: EU@0% = -(PV0*2.5) - 10 EU@100% = 794 + EU@0% Please note – the 794 value is a constant that is inherent to the setup of the device. This constant has no relevance to the user other than its use in the above formula. Example With the valve at 0° position the sensor output is reading 25 PCT. The value for EU@0% and EU@100% would then be: EU@0% = -(25*2.5) – 10 = -72.5 EU@100% = 794 + -72.5 = 721.5 The above formula will result in increasing values when rotating the shaft clockwise. If it is desired to have decreasing values with clockwise rotation then flip the polarity of EU@0% and EU@100%. In the above example EU@0% would equal 72.5 and EU@100% would equal -721.5.
6	In Wireless Builder, in the Main tab, set unit to OOS. In the Range tab, input these two values in the appropriate fields. After inputting the new EU Values, in the Main tab, set unit to AUTO
7	Adjust the valve to the 0° position and confirm that the sensor output now displays 0 DEG. Reposition the valve to another location and confirm the value sensor output value is approximately as expected.
8	Reset update rate by following steps 3 – 3.6 in table 3.

Restoring Factory Settings

Prior to scaling or converting the engineering units it is necessary to confirm the range values of the device are set at the factory defaults. To return the range settings to the factory defaults, follow the instructions in Table 5.

Table 6. Restoring Factory Default Range Settings

Step	Action
1	In Wireless Builder in the range tab, verify the readings for EU@100 % and EU@0 %. The factory settings are EU@100 % = 314 and EU@0% = -4%. If these have been changed, then they need to be reset to these values.
2	In Wireless Builder, in the Main tab, set unit to OOS. In the Range tab, input these two values in the appropriate fields. After inputting the new EU Values, in the Main tab, set unit to AUTO.

There are options in Wireless Builder to restore calibration and clear calibration. Do not use the Cal Clear or Cal Restore options as this may result in incorrect sensor output readings and require the unit to be returned for factory calibration.

4. Function Blocks

4.1 Introduction

This section explains the construction and contents of the WCX Series Valve Position Sensor Function Blocks.

4.2 Block Description

Block types

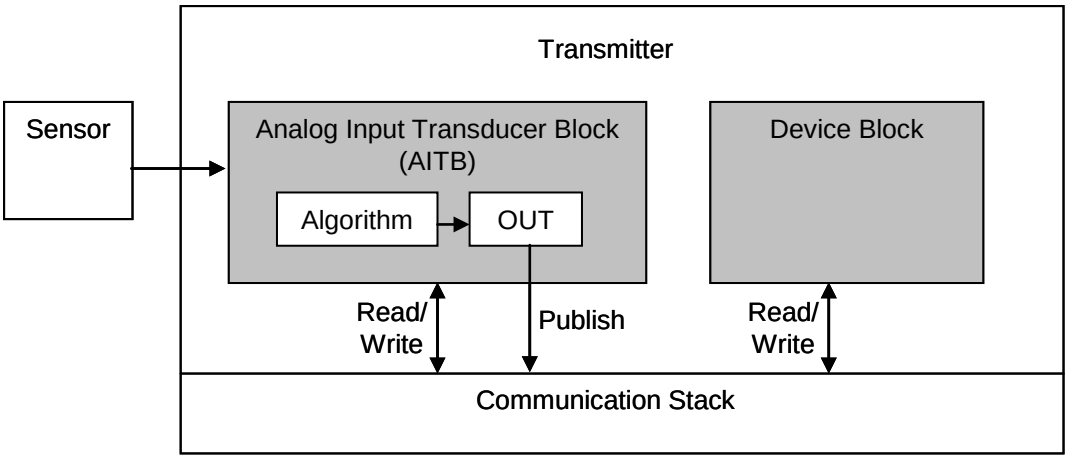
Blocks are the key elements that make up the sensor's configuration. The blocks contain data (block objects and parameters) which define the application, such as the inputs and outputs, signal processing and connections to other applications. The WCX Series valve position sensor contains the following block types.

Block Type	Function
Device	Contains parameters related to the overall field device rather than a specific input or output channel within it. A field device has exactly one device block.
AITB	Contains parameters related to a specific process input or output channel in a measurement or actuation device. An AITB defines a measurement sensor channel for an analog process variable represented by a floating-point value. There is one AITB per sensor.
Radio	Contains parameters related to radio communication between the sensor and the multimode(s).

Block diagram

Figure 7 shows the blocks of the WCX Series valve position sensor.

Figure 7. Block Diagram



Each of these blocks contains parameters that are standard OneWireless-sensor defined parameters. The AITB and device blocks contain standard parameters common to the WCX Series sensor models (that is, degrees of rotation, voltage, percentage). The radio block contains parameters for communication with the wireless network.

4.3 Parameter Details

The sensor itself displays a few basic parameters, such as tag, serial number, device revision, build, device address, WFN ID.

For more information on parameters, refer to the following documents.

- OneWireless™ Wireless Builder User's Guide
- OneWireless™ Builder Parameter Reference

5. Operation

5.1 Overview

Display modes

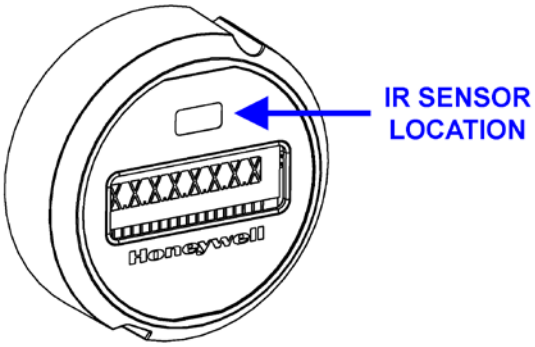
The sensor has the following display modes.

- **Test**. Appears briefly after power-up to self-test the display.
- **Connection status**. Appears when sensor is not fully connected to the OneWireless™ network. See section 5.2.
- **PV display**. Default mode of the sensor displays the PV and any status messages. See section 5.3 on page 24.
- **Quick view** of sensor identification parameters. Displays read-only parameters then returns to PV display. See section 5.4 on page 26.
- **Menu**. See section 5.5 on page 27.

Infrared Receiver

To navigate the sensor displays and menus, remove cover and hold the authentication device no more than 152,4 mm [6 in] from the sensor and aim the infrared beam at the sensor display while tapping the device local configuration buttons (Table 12). You can also use the PDA's buttons.

Figure 8. IR Sensor locations



Authentication device menus are described in section 5.6 starting on page 28.

5.2 Sensor Connection Status

Table 7. WCX Series sensor connection status

Displayed status	Definition	What to do
NO KEY	Sensor needs a key from the authentication device and is not transmitting.	Transmit a key to the sensor. See page 29.
NOT CONN	Sensor is in between discovery attempts.	If sensor does not make a connection within five minutes, do the following: • Check that key is correct for the network you are trying to join. • Check that multinode(s) in the local area are turned on and are already a secure part of the network. • Check if keyserver is active. • Check the keyserver event log to see if the sensor is actively trying to join. Errors in the event log show that the sensor is trying to join but that there are problems. Consult the OneWireless™ wireless builder documentation for troubleshooting errors.
DISCOVER	Sensor has not made a connection to a multinode and is in discovery (searching for a connection to a multinode). Sensor will automatically enter a power saving mode if it cannot make a connection and will retry later.	Wait for connection. If sensor does not make a connection within five minutes, see NOT CONN in this table.
SECURING	Sensor has connected with the network and is validating its key.	Wait for connection. If sensor does not make a connection within five minutes, see NOT CONN in this table.
CONNECTD	Sensor has validated the key and has made a secure connection with at least two multinodes. Sensor should appear in wireless builder as an uncommissioned device.	No action required.
NO REDUN	No redundancy, that is, sensor has connected with only one multinode.	No action required. The sensor will periodically look for a second multinode in order to form a redundant connection to the network

5.3 Sensor PV Display

In PV display, the following information is displayed in sequence.

Item displayed	Example	Details
Channel number	1	Channel number.
PV value	50.0	Latest PV value.
PV engineering units	Deg., Volts dc, or Percent	See Table 8.
PV status	BAD	See Table 9. If PV status is not displayed then the PV value is good.
Device status	LOW BATT	See Table 10. If multiple device status messages are in effect, they are displayed one message per channel until all messages have been displayed. If no device status is displayed then the device status is normal.

Table 8. PV engineering units

Engineering units	Description
Deg.	Degrees of rotation *(default units)*
% (Percent)	Percent
Voltage (dc voltage)	Internal voltage measured

Table 9. PV status

PV status	Cause - Action
(blank)	• PV is normal – no action required
BAD	• AITB can not execute due to internal firmware state – attempt cold restart of device. • AITB can not execute due to hardware fault – sensor module must be replaced • Sensor failure – check the following: – Connection between sensor board and potentiometer – Reference source connections on battery holder – Proper engagement of input shaft to potentiometer shaft
UNC	• **Warning**: Input inaccurate due to uncertain input data integrity. • **Warning:** Input inaccurate due to input conversion limitations or resolution.

Table 10. Device status

Sensor display	Wireless Builder display	Definition	What to do
OUT SVC	OOS	All channels are out of service	Restore mode to auto in wireless builder
CFG ERR	Configuration Error	Configuration check error	Database is corrupted. Cold start and reload configuration
LOW BAT	Low Battery	Battery voltage critically low	Replace batteries as soon as possible. See page 35
NO RADIO	Radio Interprocessor Comm Error	Radio board is not accessible	Restart both the radio and sensor. If condition persists, sensor module must be replaced
BAD RADIO SPI	Sensor Radio SPI Communication Failure	Radio detected loss of communication with sensor board over the inter-processor communication link	Restart both the radio and sensor. If condition persists, sensor module must be replaced
BAD RADIO EEPROM	EEPROM SPI Communication Failure	Radio EEPROM SPI communication failure	The radio will not be able to perform firmware upgrades but will operate normally using installed code. Sensor module should be replaced
RADIO WDT RESET	WDT Reset Occurred	Radio watch dog timeout detected	Restart both the radio and sensor. If condition persists, sensor module must be replaced
BAD RADIO	Radio Circuitry Failure	Radio circuitry has failed	The radio processor detected error on internal radio circuitry. Sensor module must be replaced
The following status messages have multiple meanings. Refer to Wireless Builder Device Status for exact cause.			
E FAIL	A/D Failure	Diagnostics detected defect with analog to digital converter	Sensor module must be replaced
E FAIL	Electronics Failure	Electronic failure detected on sensor board. **Could be caused by one of the status items marked by ***	Restart both the radio and sensor. If condition persists, sensor module must be replaced
E FAIL*	NVM Fault*	Startup diagnostics detected defect in sensor non-volatile memory	Sensor module must be replaced
E FAIL*	Program Memory Fault*	Startup diagnostics detected defect in sensor read only memory	Sensor module must be replaced
E FAIL*	RAM Fault*	Startup diagnostics detected defect in processor random access memory	Sensor module must be replaced
INP FAIL	Input Failure	Input error	Check potentiometer connections. Verify that slip clutch is properly engaged with input shaft. Check slip clutch operation. Restart the sensor. If condition persists, sensor module must be replaced
INP FAIL	A/D Failure	Diagnostics detected defect with analog to digital converter	Sensor module must be replaced

The following statuses are displayed only in Wireless Builder Device Status.			
blank*	Device/Firmware Mismatch*	Sensor board firmware error. The software did not pass verification tests	Sensor module must be replaced
blank*	Heap Memory Not Available*	Heap allocation failure. Software detected heap shortage and some communication packets may have been dropped	Clear by warm restart of device. If condition persists contact Honeywell service
blank*	Watchdog Timer Error*	Sensor watchdog timeout. The processor was restarted due to unexpected operation	Clear by warm restart of device. If condition persists contact Honeywell service

5.4 Sensor Quick View of Parameters

If you press the up or down arrow key during the PV display, the following quick view parameters are shown sequentially, then the PV display resumes.

Parameter	Description
Sensor type	HONEYWELL WCX valve position sensor
Tag	The name given to this sensor
Serial number	Sensor serial number. This is the WBSN on the sensor's nameplate. Do not confuse this with the other nameplate item marked "Serial."
Device revision	This parameter changes whenever objects and parameters are added, deleted, or the data type or range changes. It does not change if the application firmware changes without affecting the device description.
Build	Sensor firmware number

5.5 Sensor Menu

Menu tree

At the PV display, press Enter to access the menus. To interact with the menus use the device local configuration onscreen buttons (page 31) or the buttons on your PDA.

Table 11. Menu tree

Menu item	Description
CAL	Calibration menu. Do not use. Device is calibrated at the factory. See section 3.6 for setting the range or converting the units.
RADIO	Radio menu
PRI RSSI	Primary receive signal strength. Read only. Signal strength 00 is too weak to connect to the network. Displayed value / Value dBm / Rx Margin dB 00 / < -86 / < 10 01 / -86 to -81 / 10 to 15 02 / -80 to -75 / 16 to 21 03 / -74 to -69 / 22 to 27 04 / -68 to -63 / 28 to 33 05 / -62 to -57 / 34 to 39 06 / -56 to -51 / 40 to 45 07 / -50 to -45 / 46 to 51 08 / -44 to -11 / 52 to 85 09 / ≥ -10 / Saturation
SEC RSSI	Secondary receive signal strength. Same as PRI RSSI. Read only.
WFN ID	Wireless Field Network ID. Read only.
DEV ADD	Device address. Read only.
TX POWER	Radio transmit power. Read only.

5.6 Authentication Device

Install the Authentication Device application on any PDA having:

- Windows Mobile version 4.2+
- Infrared port

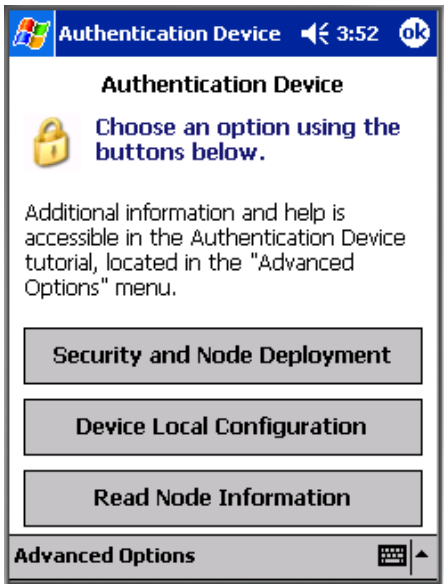
Aligning to sensor IR receiver

Hold the Authentication Device no more than 6” (15 cm) from the sensor and aim the infrared beam at the sensor display while tapping on the screen command or button.

Main menu

The main menu is shown below. Details start on the next page.

Figure 9. Main menu

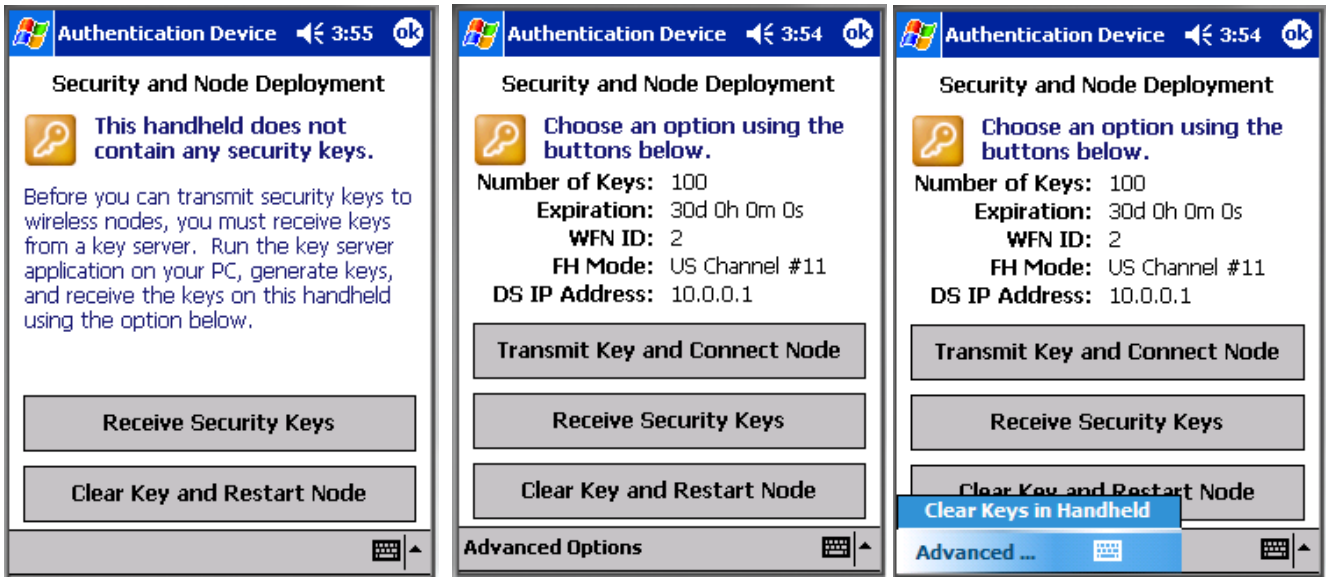

Authentication Device
3:52
ok
Authentication Device
Choose an option using the buttons below.
Additional information and help is accessible in the Authentication Device tutorial, located in the "Advanced Options" menu.
Security and Node Deployment
Device Local Configuration
Read Node Information
Advanced Options

Security and node deployment

Use this to:

- receive new security keys,
- transmit security keys for connecting the sensor (or other nodes) to the OneWireless™ network,
- clear all security keys from the PDA,
- clear the sensor's key and reset its configuration to factory default (such as for decommissioning).

Figure 10. Security and device deployment


Authentication Device 3:55 ok
Security and Node Deployment
This handheld does not contain any security keys.
Before you can transmit security keys to wireless nodes, you must receive keys from a key server. Run the key server application on your PC, generate keys, and receive the keys on this handheld using the option below.
Receive Security Keys
Clear Key and Restart Node
Authentication Device 3:54 ok
Security and Node Deployment
Choose an option using the buttons below.
Number of Keys: 100
Expiration: 30d 0h 0m 0s
WFN ID: 2
FH Mode: US Channel #11
DS IP Address: 10.0.0.1
Transmit Key and Connect Node
Receive Security Keys
Clear Key and Restart Node
Advanced Options
Authentication Device 3:54 ok
Security and Node Deployment
Choose an option using the buttons below.
Number of Keys: 100
Expiration: 30d 0h 0m 0s
WFN ID: 2
FH Mode: US Channel #11
DS IP Address: 10.0.0.1
Transmit Key and Connect Node
Receive Security Keys
Clear Key and Restart Node
Clear Keys in Handheld
Advanced ...

To connect your sensor to the OneWireless™ network perform the following steps.

Step	Action
1	If the PDA contains no keys, obtain new security keys from the PC application Key Server Manager. To do this, select **Receive Security Keys**. Keys can be received either through Infrared (by aiming PDA at the infrared dongle) or through an ActiveSync/USB connection. See **Key Server Communication Method** under Advanced options on page 34 for details. **Important**: The Comm Method settings must match in the PC's Key Server Manager and in the Authentication Device (both must be set to Infrared or both to ActiveSync) in order for your PDA to receive security keys. See **Key Server Communication Method** under Advanced options on page page 34 for details.
2	When the Authentication Device has valid unexpired keys, aim it at the sensor and transmit a key to the sensor. The sensor will validate the key and then use it to make a connection to the OneWireless™ Network. The Sensor may continue to show the diagnostic message "NO KEY" for a brief time while it validates the key before showing the "DISCOVER" message. To verify your sensor has been authenticated, see the Connection prompt on the Read Node Info screen (page 32).

To decommission your sensor from the OneWireless™ network, select **Clear Key and Restart Node**. This clears the sensor's key, network and security configurations, and resets the sensor to its factory default settings. Perform the following steps.

Select **Clear Keys from Handheld** (under Advanced Options) when:

- The PDA has keys from one system, but you have moved your authentication device to another system, or
- You want to clear all keys so that you cannot deploy any more keys without going to the key server manager and getting more.

For more details on keys, refer to Getting Started with Honeywell OneWireless™ Solutions.

Device Local Configuration

Use device local configuration buttons (Figure 11) to navigate the sensor menus (Table 11) and to make selections and changes. You can also use the PDA buttons.

Figure 11. Device local configuration screen

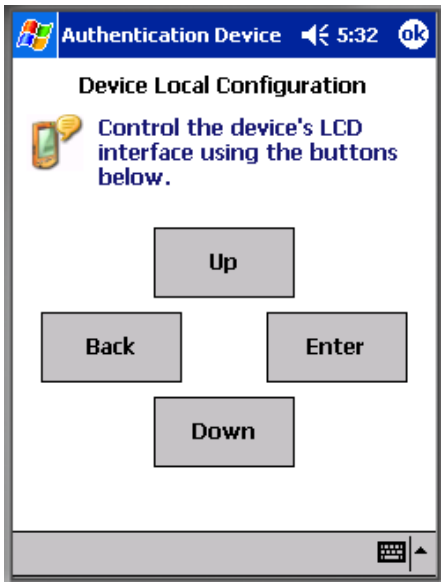


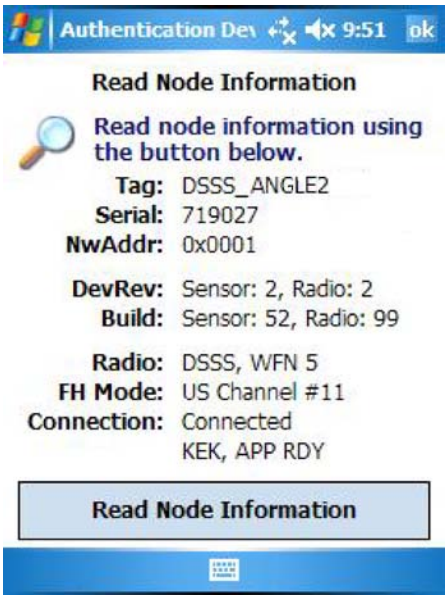
Table 12. Buttons for device local configuration

Button	Function
Enter	• Enter the menu tree • Enter submenu of the menu that is appearing on the screen • Execute action • Submit the entered number while doing number entry • Read value of certain displayed parameters
Up	• Go to the next menu in the same level • View quick view parameters in normal display sequence (PV display) • During number entry, increment the digit or change +/- sign
Down	• Go to the previous menu in the same level • View quick view parameters in normal display sequence (PV Display) • During number entry, decrement the digit or change +/- sign
Back	• Go to the upper menu level • When changing a number value, move cursor to the left/more significant digit, then wrap around to the least significant digit

Read node information

Use this to read the sensor's information shown in Figure 12. Similar to quick view parameters on the sensor display. (See page 26.)

Figure 12. Read node information



Item	Description
Tag	The name given to this sensor
Serial	Sensor serial number. This is the WBSN on the sensor's nameplate. Do not confuse this with the other nameplate item marked "Serial"
NwAddr	Network address of the device in hexadecimal
DevRev	Device Revision. This parameter changes whenever objects and parameters are added, deleted, or their data type or range changes. It does not change if the application firmware changes without affecting the device description. Range: 0 to 65535
Build	Sensor firmware and radio firmware build numbers
Radio	Hardware radio type, FHSS or DSSS WFN ID: Wireless Field Network ID. Range: 0 to 255

Item	Description
FH Mode	Frequency group or frequency channel selection used by the wireless network of the device. The value must match the value set in the gateway and interface nodes to allow communication between the device and the wireless network. Modes: US Channel #1 US Channel #6 US Channel #11 US Guard Bands EU Channel #1 EU Channel #7 EU Channel #13 EU Guard Bands US/EU Spec Div A US/EU Spec Div B US/EU Channel #3 US/EU Channel #10 Complete Spectrum
Connection	The first line displays one of the following connection states. No Security Key – No security key has been deployed to the device or multinode. The user must give a security key to the device or multinode before it will join the wireless sensor network. No Connection – A security key exists in the device or multinode, but no connection has been formed. The device or multinode is waiting to form a connection and will automatically retry shortly. Users may transmit a new security key in order to force the device or multinode to immediately retry to form a connection. Discovering – The device is attempting to form a connection to the wireless sensor network. The device is discovering multinodes and, if a multinode is found, will transition to the securing state. Securing – The device is attempting to form a connection to the wireless sensor network. The device has discovered one or two multinodes and is attempting to form a secure session. If successful, the device will transition to the connected state. Connected – A secure connection is formed with one or two multinodes. The second line contains detailed state information useful for problem reporting.

Advanced options

Advanced options are non-typical configuration commands.

Figure 13. Advanced options

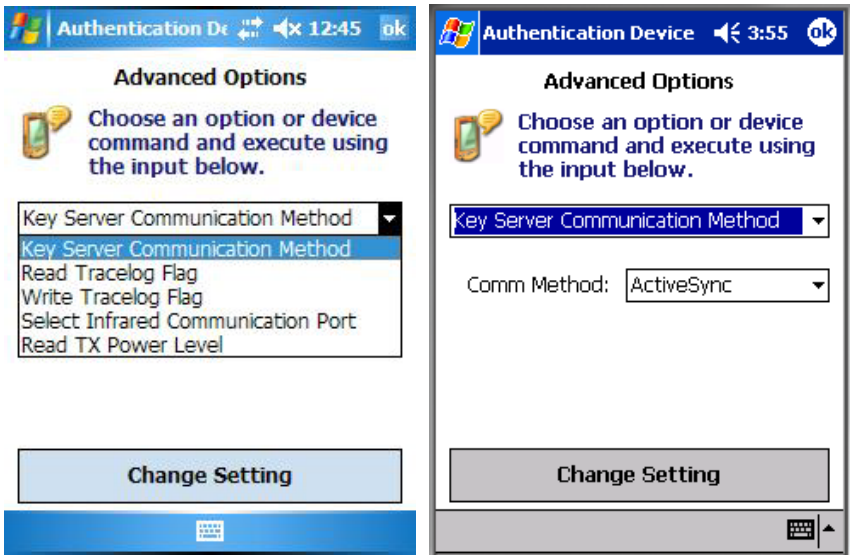


Table 13. Advanced Options

Item	Description
Key server communication method	Determines how the PDA will receive security keys from the PC's key server manager application. From the comm method menu select one of the following methods. **ActiveSync** – Select this to receive keys over a USB connection, such as while the PDA battery is being charged in its base. **Infrared** – Select this to receive keys over the infrared port. **Important**: The comm method settings match in the PC's key server manager and in the authentication device (both must be set to Infrared or both to activesync) in order for your PDA to receive security keys.
Read tracelog flag	Not available for sensors. Used with multinodes. Reads conditional tracelog flag value. Tracelog flags are used to enable and disable logging functionality used for field support.
Write tracelog flag	Not available for sensors. Used with multinodes. Writes conditional tracelog flag value. Tracelog flags are used to enable and disable logging functionality used for field support .
Select infrared communication port	Overrides the detected infrared communication port detected on your PDA. If infrared communication is not functioning, you can override the detected settings using this option.
Read TX power level	Reads the transmission power level of the sensor radio.

6. Maintenance/Repair

6.1 Replacing Batteries

When to replace

When the sensor displays a LOW BAT message you have 2 to 4 weeks to replace both batteries before they expire. When batteries are removed or expired, all sensor data is retained in the Radio Board's non-volatile memory. All calibration data is retained in the measurement board's non-volatile memory, however, if the sensor was physically removed and re-installed, the calibration must be re-checked.

Figure 14. Low Battery Warning

Tools required

- T-15 Security TORX screwdriver (Bit supplied with product) (if applicable)
- #2 Phillips screwdriver or 1/4 in slotted screwdriver
- Torque screwdriver
- Large screwdriver or other flat tool
- Heavy tweezers or needle-nose pliers

Procedure

ATTENTION

Batteries must be replaced only by a trained service technician.

WARNINGS

- Risk of death or serious injury by explosion. Do not open sensor enclosure when an explosive gas atmosphere is present.
- Batteries must not be changed in an explosive gas atmosphere.
- The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not recharge, disassemble, heat above 100°C [212°F], or incinerate.
- When installing batteries, do not snag the battery terminal on the clip or the battery may be damaged. Do not apply excessive force.
- Do not drop. Dropping the battery may cause damage. If a battery is dropped, do not install the dropped battery into the sensor. Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

Table 14. Battery replacement procedure

(For item numbers, refer to Figure 9)

Step	Action
	WARNING Risk of death or serious injury from explosion or fire. If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.
	ATTENTION You must replace both batteries. Both batteries must be the same model from the same manufacturer. Mixing old and new batteries or different manufacturers is not advised. Use only the following 3.6 V lithium thionyl chloride (Li-SOCl2) batteries (non-rechargeable), size C. No other batteries are approved for use in WCX Series valve position sensor. • Xeno Energy XL-145F • Tadiran TL-5920/S
1	Honeywell recommends that the sensor be removed from service and moved to a clean area before servicing.
2	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
3	If necessary, place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
4	Unplug cable from potentiometer (4) to Jack J2 on battery board (see Figure 10), by compressing the locking clip and pulling outward.
5	Loosen the two battery holder retaining screws (5) (closest to the batteries). The screws are captive.
6	Pull the sensor/battery module (6) out of the sensor.
	ATTENTION Do not pull on the antenna cable itself, as it will damage the cable.
7	If battery holder is to be completely removed, use tweezers or needle nose pliers to carefully unplug the lower end of the antenna jumper cable from the right angle connector on the antenna cable. See Figure 10. If battery holder is not to be completely removed, place a clean antistatic bag or equivalent, between the battery assembly and the housing.
8	Remove the old batteries (7) from the battery holder. If needed, pry out the batteries by using a slotted screwdriver as a lever in the holder's side slots. See Figure 10.

Step	Action
	ATTENTION Note that both batteries in the WCX Series valve position sensor are installed with the same orientation, with each positive terminal facing toward the sensor module.
9	Install batteries (7) as follows to avoid damage to the batteries and holder: Do not attempt to bend the battery hold down tabs upward. Insert the battery negative end under the hold-down tab, at an angle, and against the end of the spring. Simultaneously move the negative end of the battery into position, compressing the spring, and angle the positive end into the holder. See Figure 10. Repeat this process for the second battery.
10	Insert the battery holder into the sensor. Reattach the captive screws (5) and tighten to 0,4 – 0,6 N-M (3.5 – 5.3 Lb-in).
11	Plug cable from potentiometer (4) into Jack J2 on battery board. Note that the potentiometer cable goes to the outside of the antenna cable. See Figure 10.
12	If the antenna jumper cable was disconnected, use tweezers or needle nose pliers to grip the right angle antenna connector, hold the lower end of the antenna jumper cable steady, and carefully press the connectors together. A distinct click should be heard as the connector is fully seated.
13	NOTE: Honeywell recommends lubricating the cover O-ring (8) and threads with a Silicone Grease such as Dow Corning™ #55 or equivalent before replacing the cover. Replace cover, tightening hand tight. If applicable, replace cover lock clamp and two T-15 TORX screws. Re-install and return sensor to service.
14	If the unit removal or re-installation caused the input shaft to be rotated enough to make the internal slip clutch slip, then re-setting the device angle must be performed (see section 3).
15	Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

Figure 15. Battery replacement

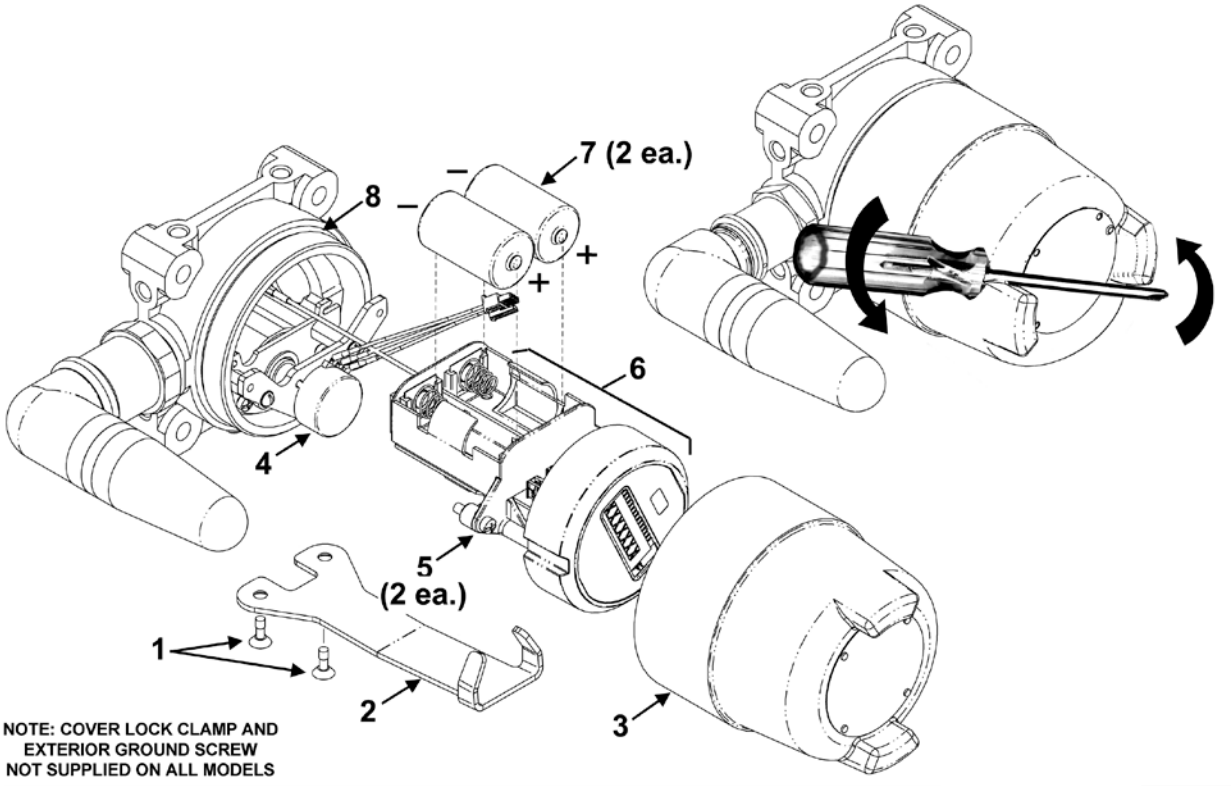


Figure 16. Battery replacement details

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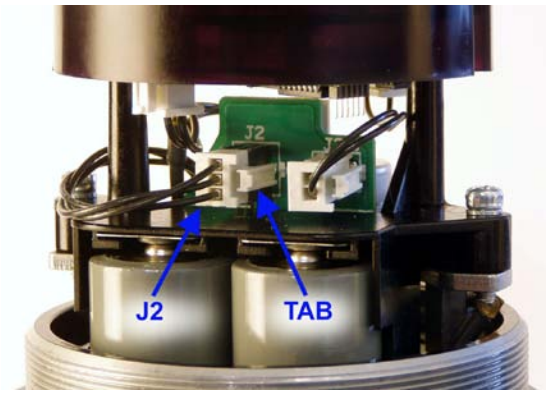
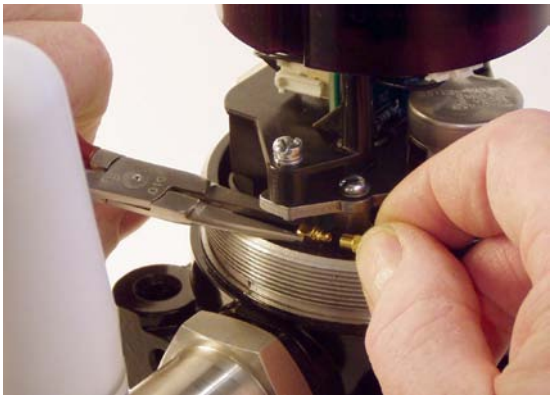
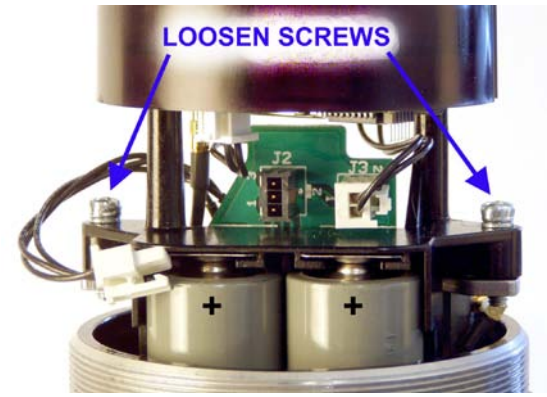
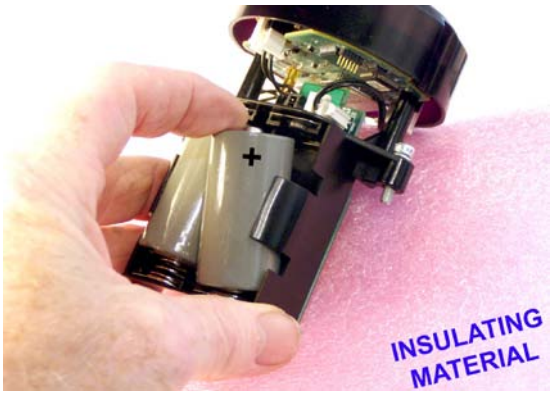
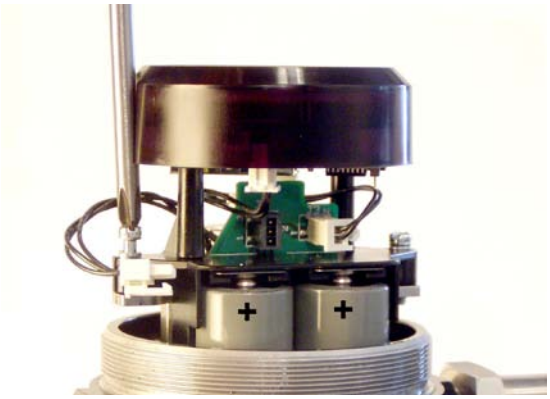
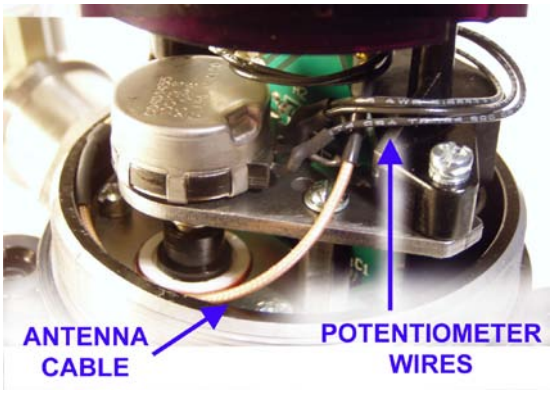
<tr><td> 
</td><td>  </td></tr>
<tr><td>Remove J2 by pressing tab and pulling J2</td><td>OPTIONAL - Disconnect RF cable</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Loosen two captive screws, remove assembly</td><td>Press top down, pull battery out on an angle</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Replace batteries, install assy., tighten screws</td><td>Replace J2, check wire & cable routing</td></tr>
</table>

6.2 Replacing Antenna

Tools required

- T-15 Security TORX screwdriver (Bit supplied with product) (if applicable)
- #2 Phillips screwdriver or 1/4 in slotted screwdriver
- Torque screwdriver
- Large screwdriver or other flat tool
- Hex wrench - 1,5mm (supplied with product)
- Heavy tweezers or needle-nose pliers

Procedure

ATTENTION

You must replace your antenna with the same type: elbow or straight. Stainless steel must be replaced with stainless steel, aluminum with aluminum. Changing to a different antenna type is not permitted by approval agencies.

CAUTION

Take precautions against electrostatic discharge to prevent damaging the sensor module.

WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

The integrally mounted antenna shroud is made of Teflon® and has a surface resistance greater than 1Gohm per square. When the WCX Series valve position sensor is installed in potentially hazardous locations care should be taken not to electrostatically charge the surface of the antenna shroud by rubbing the surface with a cloth, or cleaning the surface with a solvent. If electrostatically charged, discharge of the antenna shroud to a person or a tool could possibly ignite a surrounding hazardous atmosphere.

Table 15. Antenna replacement procedure
(For item numbers, refer to Figure 10)

Step	Action
1	Honeywell recommends that the sensor be removed from service and moved to a clean area before servicing. Use care to avoid rotating the input shaft, causing the internal slip clutch to slip.
2	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
3	Place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
4	Unplug cable from potentiometer (4) to Jack J2 on battery board, by compressing the locking clip and pulling outward. See Figure 12.
5	Loosen the two battery holder retaining screws (5) (closest to the batteries). The screws are captive.
	ATTENTION NOTE: Use caution in disconnecting the antenna cable, as applying too much pressure can damage the connectors. NOTE: Antenna location 1 is illustrated. For sensors using antenna locationi 2, the antenna cable routing will be through the opposite slot in lower mounting plate.
6	Remove the sensor/battery module (6) from the sensor body and carefully disconnect the lower connector of the antenna jumper cable (7) from the right angle connector on the antenna cable (8). See Figure 12.
7	Loosen two screws on lower mounting plate (9) and raise the plate sufficiently to allow the release of the antenna's cable. See Figure 12. Lower the lower plate, insuring that the white end bearing on the plate fits back into the shaft assembly. Temporarily tighten screws.
8	Using a 1.5 mm (approx. 1/16") allen wrench, loosen the locking set screw (10) at the antenna base. Note that its position may differ from illustrated. Unscrew the antenna from the sensor. Remove the antenna (11) and its connector from the sensor.
9	Lubricate the new antenna's threads and O-ring (12) with a silicone grease such as Dow Corning #55 or equivalent. Feed the new antenna’s connector (8) through the antenna hole to the front of the sensor. Do not connect to sensor module cable yet. Screw new antenna into sensor body until finger-tight. For elbow type, back off 180 degrees to permit adjustment later.
10	Loosen two screws on lower mounting plate (9) and raise the plate sufficiently to allow the insertion of the antenna's cable back into the notch in the plate. See Figure 12. Tighten screws and torque to 0,4 Nm to 0,6 Nm [3.5 in-lb to 5.3 in-lb].
11	Use tweezers or needle nose pliers to grip the right angle antenna connector, hold the lower end of the antenna jumper cable steady, and carefully press the connectors together. A distinct click should be heard as the connector is fully seated.
12	Insert sensor/battery module. Tighten the two captive battery module screws. Torque screws to 0,4 Nm to 0,6 Nm [3.5 in-lb to 5.3 in-lb].
13	Plug cable from potentiometer (4) into Jack J2 on battery board. Note that the potentiometer cable goes to the outside of the antenna cable. See Figure 12).
14	NOTE: Honeywell recommends lubricating the cover O-ring (13) and threads with a silicone grease such as Dow Corning ™ #55 or equivalent before replacing the cover. Replace cover, tightening hand tight. If applicable, replace cover lock clamp and two T-15 TORX screws. Return sensor to service.

Step	Action
15	If the unit removal or re-installation caused the input shaft to be rotated enough to make the internal slip clutch slip, then re-setting the device angle must be performed (see section 3).
16	For elbow type antenna, adjust antenna for best reception. Don't rotate antenna more than 180 degrees either direction or you could twist and break the antenna wiring inside. Tighten the antenna locking set screw (10).

Figure 17. Antenna replacement

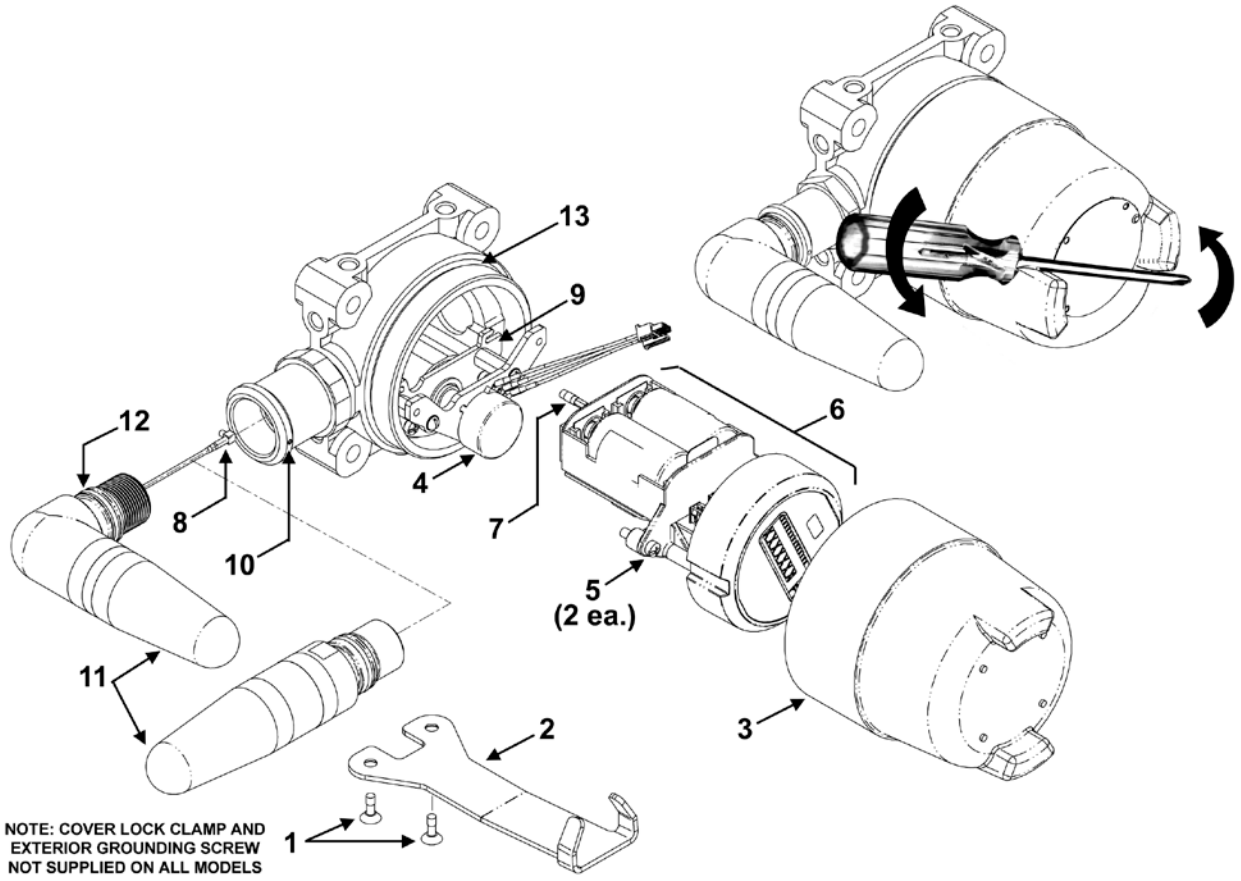
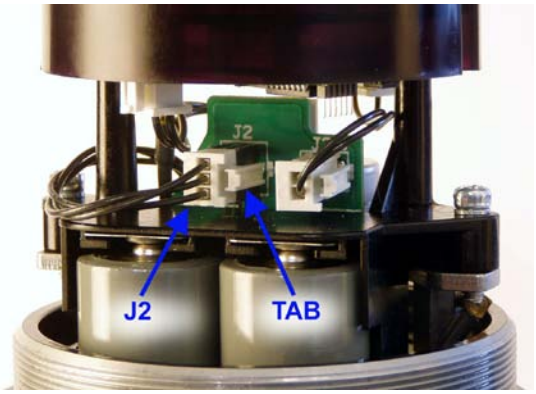
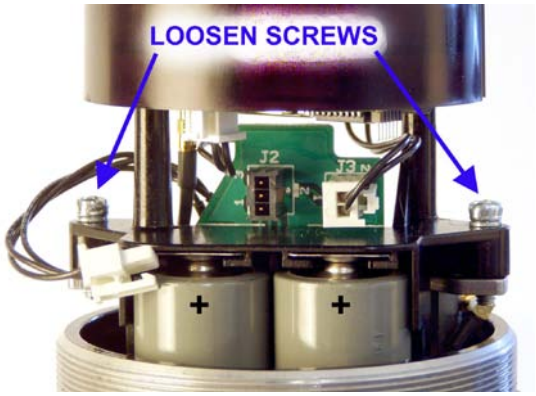
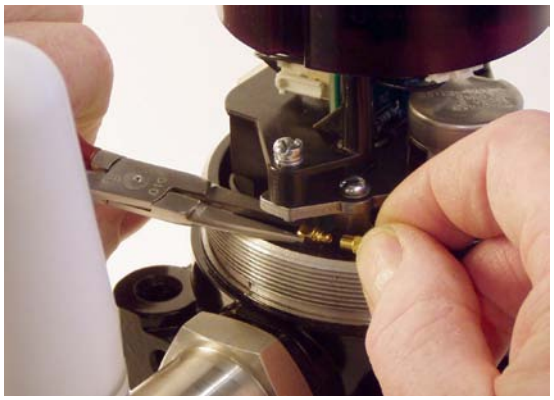
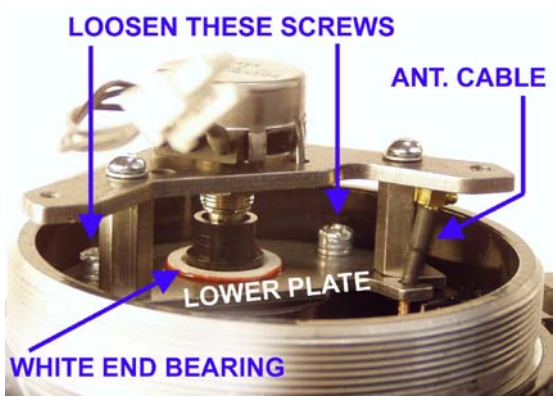
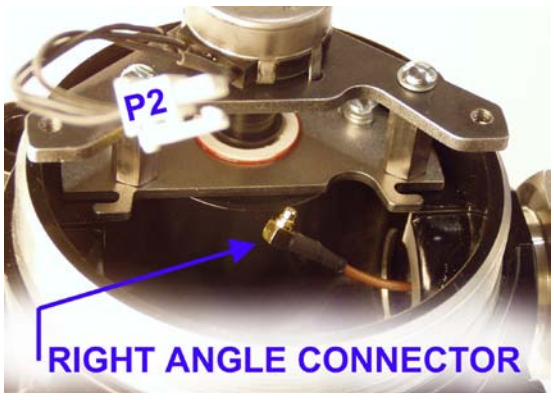
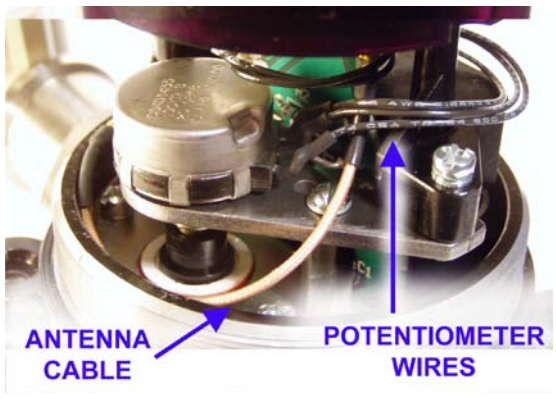


Figure 18. Antenna replacement details

<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Remove J2 by pressing tab and pulling J2</td><td>Loosen two captive screws, remove assembly</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Disconnect RF cable to antenna</td><td>Loosen 2 screws on lower mounting plate</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Release cable before unscrewing antenna</td><td>Install assy., check wire & cable routing</td></tr>
</table>

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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Internet: www.honeywell.com/sensing

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